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Effectiveness of giving tongkol fish and moringa oleifera to increase hemoglobin levels in anemic pregnant women

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ABSTRACT

Anemia in pregnant women is a health problem associated with a high incidence of bleeding and can cause complications both in the mother and in the fetus. The purpose of this study was to determine the effectiveness of giving tongkol fish and Moringa Oleifera to increase hemoglobin levels in anemic pregnant women. This design research is quasy-experiments with purposive sampling technique obtained a sample of 30 respondents. The independent variable is the provision of tongkol and Moringa Oleifera, the dependent variable is the increase in hemoglobin levels, with independent T-test statistics. Average hemoglobin levels of respondents before receiving treatment tongkol are 10.3 gr/dL, after receiving treatment tongkol fish are 12 gr/dL, before receiving treatment Moringa Oleifera are 10.3 gr/dL, after receiving receiving treatment Moringa Oleifera are 1 gr/dL. The analysis results are p = 0.001 < 0.05, so H1 is accepted this means that giving tongkol fish and Moringa Oleifera is effective in increasing hemoglobin levels in anemic pregnant women. Providing additional food from local ingredients in the form of tongkol fish and Moringa Oleifera as an additional source of iron is one alternative solution to increase hemoglobin levels in pregnant women.

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INTRODUCTION

The maternal mortality ratio (MMR) is one level indicator public health in this country. World Health Organization (WHO)estimates that 303,000 cases of maternal mortality related to pregnancy and childbirth occur each year year. The MMR in 2017 in high-income countries was 11 per 100,000 live births, but in low-income countries, namely 426 births per 100,000 live birth (Julfiana, 2022).

Based on 2018 WHO data, anemia in pregnancy is a major health problem in developing countries with high levels of morbidity and mortality in pregnant women. The total number of anemia sufferers among pregnant women in Indonesia is 70%, meaning that out of 10 pregnant women, as many as 7 people will suffer from anemia. According to the results of Basic Health Research (Riskesdas) in 2020, the percentage of anemia in pregnant women in Indonesia was 37.1%. Based on the results of the Household Health Survey (SKRT), the prevalence of iron

deficiency anemia in Indonesia among pregnant women was 63.5% in 2015, fell to 40.1% in 2019, and in 2021 fell to 24.5% (WIDIASTIINI et al., 2023). The results of basic health research recorded that in 2013 anemia in pregnant women was 37.1%, and in 2018 anemia cases in Kampar were 34.23% (Astapani et al., 2020). The prevalence of anemia in the Tarakan City Amal Beach Health Center is the highest in 2021, namely 53.5%, which is far above the national target of 45%. However, in Tarakan City's coastline area, the Amal Beach Community Health Center climbed to 41.74% in 2020 and will grow to 53.5% in 2021 (Hartika et al., 2023).

Anemia is a condition where the number of red blood cells or the concentration of hemoglobin in them is lower than normal. Hemoglobin is needed to carry oxygen and if a pregnant woman has too few or abnormal red blood cells, or not enough hemoglobin, there will be a decrease in the capacity of the blood to carry oxygen to body tissues. This causes symptoms such as fatigue, weakness, dizziness, and shortness of breath. Anemia is a serious global public health problem that mainly affects children and pregnant women. WHO estimates that 42% of children under 5 years of age and 40% of pregnant women worldwide suffer from anemia (Chendriany et al., 2021).

From preliminary data, 1,804 pregnant women were obtained in the working area of the Juata Community Health Center, Tarakan City in 2023. In the K1 examination, 115 cases were found with mild anemia and there were 2 cases of severe anemia. Meanwhile, during the K4 examination, 69 cases of mild anemia were found. From the results of the brief preliminary interviews that were conducted, there were 12 pregnant women who experienced anemia. After the interview, the pregnant woman said she only ate the food without paying attention to the nutritional intake of the food. So there is a lack of intake nutritious food during pregnancy is suspected to be the cause anemia in pregnant women.

Food ingredients that are high in iron and protein are tongkol and Moringa Oleifera. Moringa oleifera is a local plant that has been known for centuries as a multipurpose, nutrient-dense and medicinal plant. Contains more and more varied natural compounds than other types of plants (Suheti et al., 2020). Nutrient content contained in Moringa Oleifera fresh will experience an increase (concentration) when consumed after drying and mashing in powder form. Iron content in Moringa Oleifera equivalent with 25 times the iron found in spinach (Hartati & Sunarsih, 2021). The iron content in 100 grams of Moringa Oleifera is 28.2 grams. Consume a minimum of 25 mg Moringa Oleifera per day is expected to be possible fulfills 7.05 mg of iron in mother's body. If consumed for 30 days, it is expected to contribute 211.5 mg. Tablet therapy add balanced blood by consuming Moringa Oleifera you can meet maximum iron needs. So that pregnant women have sufficient hemoglobin levels. Pregnant women can avoid anemia and the other impacts it causes (Jannah et al., 2024).

The protein content of tongkol is greater than that of etong fish although it is not significantly different. The results of this study are in accordance with previous studies, where the protein content of tongkol is relatively greater than that of etong fish by 16.44% (Januarita et al., 2022). Tongkol is a type of small tuna fish with an elongated body, no scales and a hard dorsal fin texture. Tongkol is one of the most nutritious fish. They are an excellent source of protein vitamins B2, B3, B6, B12 and vitamin D. Tongkol also contains good amounts of iron and vitamin B1 (Rahman et al., 2023).

Based on this, the researcher is interested in conducting a study entitled "Effectiveness of Giving Tongkol Fish and Moringa Oleifera on Increasing Hemoglobin Levels in Pregnant Women with Anemia at the Juata Health Center, Tarakan City".

RESEARCH METHOD

This research design used a quasi experiment which was divided into two groups, namely the group given tongkol fish and the group given Moringa Oleifera with a two group prepost-test design approach. The sampling technique in this research is purposive sampling. Purposive

sampling is a technique for determining samples with consideration certain (Amin et al., 2023). In this study, the population selected was 78 pregnant women in the Juata Community Health Center area, Tarakan City. Samples were obtained through population screening based on criteria inclusion and exclusion.

The inclusion criteria in this study were having an Hb level <11gr%, being willing to be a research respondent and working together by consuming tuna and Moringa leaves during the research process, being willing to have Hb checked during the pre-test and post-test to assess hemoglobin levels in the blood. Exclusion criteria in this study were allergies to Moringa leaves or tuna, having an emergency or pregnancy complications, not following the research procedures completely. Before treatment and measurement of hemoglobin, samples who were willing to become respondents were asked to sign informed consent first as a sign of consent respondents. In this research, 30 respondents were selected be the sample in the research. Measurement of Hb levels in pregnant women with an Hb meter before and after treatment, namely using a handscoon, fixing the finger with alcohol, pricking the finger with a lancet, wiping the first blood with dry gauze, taking the next blood, putting it in a hemoglobin strip, wait or read the results for 10 to 20 seconds on the monitor, swab the blood and advise the mother to press with gauze, record the results of the examination on the observation sheet. After measuring hemoglobin, ask the test group to consume 600 mg of boneless tongkol meat/day in nugget form for 14 days for the tongkol fish feeding group and 70 mg of Moringa leaf extract per day for 14 days for the group giving Moringa leaves. Measurement of Hb levels in pregnant women with an Hb meter is carried out after treatment. After the data is collected, data processing is carried out. The independent variable in this research is the provision of tongkol fish and Moringa Oleifera. The dependent variable in this study is the increase in hemoglobin levels of pregnant women. The research instrument uses operational unit procedures and Hb Meter Easy Touch.

RESULTS AND DISCUSSIONS

General Data

Table 1. Distribution of respondent characteristics

Maternal Age	Frequency	Percentage (%)
<20 years	4	13,3
20-35 years	21	70,0
>35 years	5	16,7
Education	Frequency	Percentage (%)
Elementary School	7	23,3
Junior High School	6	20,0
Senior High School	14	46,7
University	3	10,0
Parity	Frequency	Percentage (%)
Primigravida	8	26,7
Multigravida	21	70,0
Grandemultigravida	1	3,3
Total	30	100

Based on table 1 show that most of the respondents were aged 20-35 years as many as 21 respondents (70.0%). Almost half of the respondents had at least a senior high school education, 14 respondents (46.7%). Most of the respondents is multigravida, 21 respondents (70.0%).

Special Data

Table 2. Frequency distribution of hemoglobin observation results before and after treatment

Treatment	Resppondent Code	Hemoglobin Levels (gr/dL)			
		Pre	Mean Pre	Post	Mean Post
Giving Moringa Oleifera	1	10.3	10.3	11.0	11.3
	2	9.8		11.1	
	3	10.7		11.1	
	4	10.4		11.3	
	5	10.1		11	
	6	10.5		11.1	
	7	9.7		10.4	
	8	10.8		11.8	
	9	10		11.1	
	10	9.1		10.9	
	11	10.5		11.2	
	12	10.1		11.3	
	13	10.7		12.5	
	14	10.8		12.4	
	15	10.5		11.8	
Giving Tongkol Fish	16	9.7	10.32	11.9	12.0
	17	10.8		11.4	
	18	9.8		11.8	
	19	9.9		11.7	
	20	10.3		12.4	
	21	10.2		11.2	
	22	10.7		12.3	
	23	9.7		11.8	
	24	10.9		12.8	
	25	10.1		12.3	
	26	10.6		12.4	
	27	10.5		12.3	
	28	10.4		12	
	29	10.9		11.8	
	30	10.3		12.3	

Based on table 2 show that the difference in average hemoglobin levels between the first day or before treatment was 10.3 gr/dL and the fourteenth day or after treatment was 11.3 gr/dL in the Moringa Oleifera treatment. Meanwhile for hemoglobin levels between the first day or before treatment, namely 10.32 gr/dL and on the fourteenth day or after being given treatment, namely 12.0 gr/dL in the treatment of tongkol fish.

Table 3. Analysis of statistical test results

Independent Samples Test						
		F	sig	t	df	Sig. (2-tailed
Equality of Variances		.073	.789	-3.773	28	.001
Equal variances assumed				-3.773	27.499	.001

Based on table 3 show that the statistical tests using the Independent t test, the result was p = 0.001 < 0.05, so H0 was rejected and H1 was accepted, which means that giving tongkol fish and Moringa Oleifera was effective in increasing hemoglobin levels in anemic pregnant women at the Juata Community Health Center, Tarakan City.

Identify hemoglobin levels before giving tongkol fish

The average hemoglobin level of pregnant women before receiving treatment with tongkol fish was 10,32 gr/dL and all respondents experienced mild anemia. Anemia is a condition that occurs when the number of red blood cells (RBCs) and/or the amount of hemoglobin in the RBCs is below normal. Red blood cells and the hemoglobin they contain are needed for the transport and delivery of oxygen from the lungs to the rest of the body. Inadequate oxygen supply can harm many tissues and organs throughout the body. In pregnancy, anemia occurs Pregnancy-related anemia is an increase in plasma levels during pregnancy, which can cause blood dilution and is reflected as anemia (Carolin & Novelia, 2021).

About 95% of cases of anemia during pregnancy are caused by iron deficiency. The cause is usually inadequate food intake of the nutrients needed by the body. Iron is an essential trace element for the body. This substance is mainly needed for hematopoiesis (blood formation), namely hemoglobin synthesis. So it is important for pregnant women to get additional intake to balance the needs of pregnant women (Tampubolon et al., 2021). Before being given tongkol, all respondents experienced mild anemia. This is because pregnant women do not consume enough balanced nutritional food, one of which is fish, resulting in a decrease in hemoglobin.

Identify hemoglobin levels after giving tongkol fish

The average hemoglobin level of pregnant women after receiving treatment with tongkol fish was 12 gr/dL and overall not anemic. The protein content of tongkol is greater than that of etong fish although it is not significantly different. The results of this study are in accordance with previous studies, where the protein content of tongkol is relatively greater than that of etong fish by 16.44% (Januarita et al., 2022).

Tongkol fish own amount proteins tall compared to other animal foods. According to (Piranti et al., 2024) proteins that is inside meat tongkol fish have essential amino acids complete so that easy to digest by body. Tongkol fish too rich in minerals such as calcium, phosphorus which the body needs as bone formation, and useful iron for the formation determine hemoglobin in the blood (Inara, 2020).

Providing additional tongkol fish food in the form of nugets can be a solution to help improve the nutritional status of pregnant women to increase the mother's Hb levels. Tongkol fish is a food source that contains protein as an important building block in the human life cycle. Protein is used as a body building substance to replace and maintain damaged body cells, reproduce, digest food and maintain normal processes in the body, especially during pregnancy. 100 grams of tongkol contains 0.7 grams of iron (Fe). The iron contained in Tongkol Fish helps increase the Hb levels of pregnant women and prevents anemia (Ruaida & Soumokil, 2020).

All respondents who consumed tongkol for fourteen days were not anemic and considered that tongkol was very nutritious, easy to obtain and affordable. It was seen that there was an increase in the average hemoglobin level when compared with the hemoglobin level before being treated with the addition of additional tongkol fish food in the form of nuggets. This can happen because anemia that occurs during pregnancy can be caused by risk factors including nutritional status. Inadequate diet during pregnancy can cause pregnant women to become malnourished which will result in anemia.

Identify hemoglobin levels before giving Moringa Oleifera

The average hemoglobin level of pregnant women before receiving treatment with Moringa Oleifera was 10,3 gr/dL and all respondents experienced mild anemia. Anemia is a condition of the body that affects the number and size of cells red blood or hemoglobin (Hb) levels are lower, so it will resulting in disrupted distribution of oxygen by the blood throughout the body (Widayati & Aisah, 2021). The risks that arise if this continues are abortion, obstacles to the growth and development of the fetus in the womb, premature labor, susceptibility to infection, premature rupture of membranes, antepartum bleeding, disruption of the fetus during labor, labor in the first

stage can last a long time and abandoned parturition occurs, During the puerperium, uterine subinvolution occurs which causes postpartum bleeding, facilitates puerperineal infections, and reduces breast milk production (Fauziah & Maulany, 2021).

Pregnant women need more iron intake because at that time the fetus is experiencing faster growth, thus preventing an imbalance in the body which is characterized by low hemoglobin levels which will affect the flow of oxygen in the uterus and then damage the intrauterine condition, especially the placenta so that it doesn't look as good as it should. This should cause disruption in fetal development so that the mother gives birth to a LBW child (Lestari et al., 2023).

Identify hemoglobin levels after giving Moringa Oleifera

The average hemoglobin level of pregnant women after receiving treatment with Moringa Oleifera was 11,3 gr/dL and overall not anemic. Moringa leaves are a local plant that has been known for centuries as a multipurpose, nutrient-dense and medicinal plant. Contains more and more varied natural compounds than other types of plants (Susiyanti & Virgia, 2022).

One effort to prevent or overcome anemia can be done by adjusting your diet, namely by combining and consuming a food menu that is rich in iron and contains vitamin C to increase hemoglobin levels. We can get the benefits of this food from Moringa Oleifera (Maharani et al., 2021). Giving Moringa Oleifera 100 mg of powder contains 28.2 mg of iron so you can increases hemoglobin levels in pregnant women if consumed at least twice a day for 7-10 days (Ilmiah et al., 2023). There was an effect of giving Moringa leaf extract on increasing hemoglobin levels in pregnant women after being given it for fourteen days (Hastuti & Sari, 2022).

Efforts are being made to reduce the prevalence of anemia in pregnant women namely giving a minimum of 90 Fe tablets during pregnancy by drinking correct, providing health promotion regarding nutrition or physical needs to pregnant mother. Providing health promotion about nutrition can take various forms Foods with high nutritional value include giving Mocidu pudding (Moringa Oleifera, Citrus and Honey) which is known to have high levels of Fe and Vitamin C supplementation. Citrus or oranges can speed up the absorption of Fe in the body of pregnant women (Ilmiah et al., 2023).

Analysis of the Effectiveness of Giving Tongkol Fish and Moringa Oleifera on Increasing Hemoglobin Levels in Anemic Pregnant Women

The statistical tests using the Independent t test, the result was $p = 0.001 < 0.05$, so H0 was rejected and H1 was accepted, which means that giving tongkol fish and Moringa Oleifera was effective in increasing hemoglobin levels in anemic pregnant women. Moringa leaves are rich in minerals such as calcium, potassium, zinc, magnesium, iron and copper. Moringa leaves contains 10 times more vitamin A than carrots, 17 times more calcium than milk, 25 times more iron than spinach, 7 times more vitamin C than oranges, 9 times more protein. than yogurt and 15 times more potassium than bananas (Irianti, 2020).

Another study conducted by (Susanti et al., 2021) stated that there was an effect of giving Moringa leaf infusion to pregnant women on hemoglobin levels. This is because The nutritional content contained in fresh Moringa leaves will increase (concentration) if consumed after drying and grinding them in powder form. The iron content in Moringa leaves is equivalent to 25 times the iron found in spinach. So it can help to increase hemoglobin levels in the blood.

Meanwhile, tongkol (Euthynnus affinis) is a type of fish that comes from sea water which is cheap and easy to obtain. Tongkol fish (Euthynnus affinis) has a high nutritional content of omega 3 fatty acids and is high in protein. Every 100 g of tongkol has a chemical composition including 74.7% water, 1.5 g fat, 13.7 g protein and 8.0 g carbohydrates. Tongkol fish is a marine fish that has nutritional content, namely high protein. Apart from that, it is also rich in other nutritional content which can be used to meet the body's needs, especially to increase hemoglobin levels for pregnant women (Nofitasari & Kusuma, 2022).

The iron contained in tongkol fish helps increase the Hb levels of pregnant women and prevents anemia. Iron functions as a producer of hemoglobin in the blood. Hemoglobin is really needed by the body to carry oxygen to all tissues and nutrients that are really needed by the mother and fetus (Baihaki et al., 2022). Tongkol fish nuggets with the best treatment can be claimed as a high Fe food if every 100 g of tongkol fish nuggets can provide Fe at least 30% of the nutritional adequacy figure for teenagers, which is around 4.5 mg. The weight of one piece of tongkol fish nugget is around 17 - 20 g with an Fe value of 2.74. To get the Fe value recommended for teenagers in one day, you can consume 2 cut into nuggets (NENENG SUMARNI, 2020).

CONCLUSION

Average hemoglobin levels of respondents before receiving treatment tongkol are 10.3 gr/dL, after receiving treatment tongkol fish are 12 gr/dL, before receiving treatment Moringa Oleifera are 10.3 gr/dL, after receiving receiving treatment Moringa Oleifera are 1 gr/dL. The analysis results are $p = 0.001 < 0.05$, so H1 is accepted this means that giving tongkol fish and Moringa Oleifera is effective in increasing hemoglobin levels in anemic pregnant women. Providing additional food from local ingredients in the form of tongkol fish and Moringa Oleifera as an additional source of iron is one alternative solution to increase hemoglobin levels in pregnant women. There are no limitations in this research. It is hoped that midwives and other health workers can providing information and counseling about fulfilling balanced nutrition to increase hemoglobin levels in pregnant women and collaborating with the nutrition team to empower the community in making cob nuggets and processed moringa leaves to increase hemoglobin levels so as to prevent complications in pregnant women, especially pregnancy anemia. The government is also expected to overcome or prevent anemia with pharmacological therapy (drugs) and complementary therapy by utilizing existing natural resources.

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